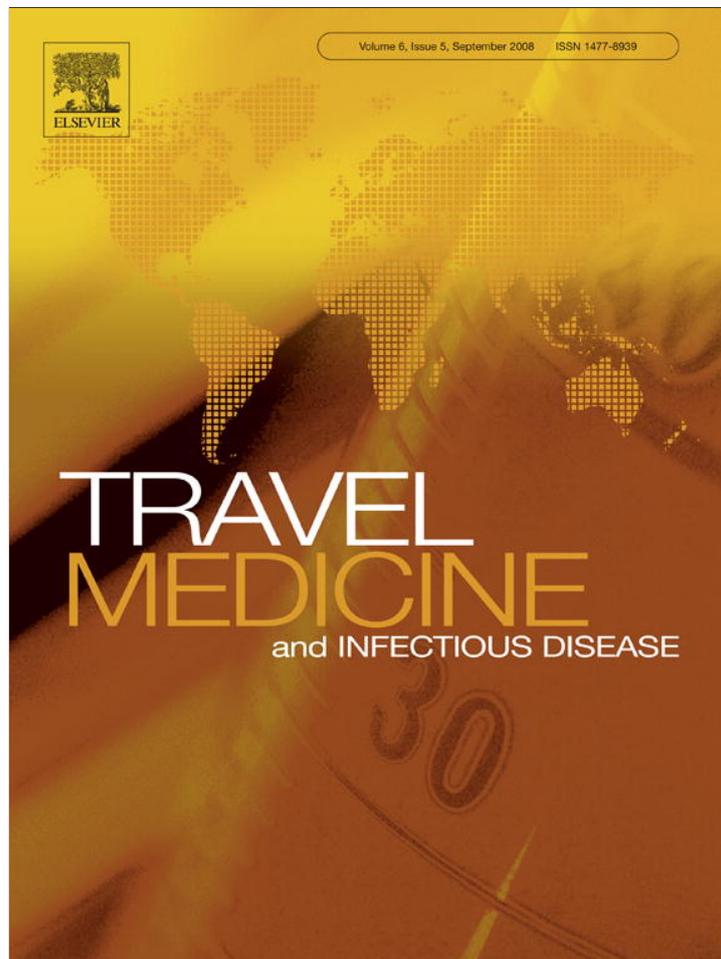


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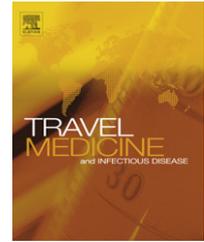


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The Flight Anxiety Situations Questionnaire and the Flight Anxiety Modality Questionnaire: Norms for people with fear of flying

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Summary *Background:* The Flight Anxiety Situations Questionnaire (FAS) and the Flight Anxiety Modality Questionnaire (FAM) are widely used in clinical practice and research studies. The aim of this study was to derive norms for people suffering from fear of flying completing the FAS and FAM.

Methods: The sample is composed of 2072 individuals suffering from fear of flying and 1012 non-patients. Means, standard deviations and percentile ranks for raw FAS and FAM subscale scores will be presented. Normative data are provided enabling the comparison of individual scores.

Results: The results showed a conspicuous difference between the patient and non-patient samples. As a whole the patient group scored higher on the scale assessing the level of anxiety experienced in different flight or flight-related situations and on the scale measuring the symptoms of anxiety or anticipatory anxiety in flight situations than the normal controls.

Conclusions: The findings of this study suggest that the FAS and FAM questionnaires can be applied in the investigation of fearful flyers and the normal population. A considerable number of flying phobics obtained scores in the clinically significant range on the subscales assessing anticipatory anxiety, in-flight anxiety, generalized flight anxiety, somatic complaints and cognitive complaints.

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Introduction

There has been observed a considerable increase of interest in research on flight phobia during the last

decades. The 3rd International Conference on Fear of Flying clearly revealed this growing interest. This world conference on fear of flying, held from 4 to 6 June 2007 at the Headquarters of the International Civil Aviation Organization (ICAO) in Montreal, showed that the group of participants, active in the field of fear of flying treatment, is growing. For the first time, it brought together representatives of major sectors of the world aviation

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community and academia, a group of professionals ranging from aviation psychologists and airline pilots to aviation lawyers. They discussed a wide range of causes and implications of fear of flying for air transport operations. The conference broadened the scope of fear of flying and recognized the need for a large prevalence investigation in different parts of the world. Fear of flying also included the myriad of events or occurrences that produce anxiety in passengers, potentially culminating in safety and security hazards, as well as negative financial repercussions for the airline industry. In a post-mortem conducted shortly after the Conference, it became evident that the phenomenon of fear of flying should from now on be addressed within the broader context of the overall physical and psychological health of passengers, and that this should be carried out under the guidance and auspices of the recognized world authority for civil aviation – ICAO. Civil Aviation Administrations should ensure that the prevalence of fear of flying is continuously recorded through regular surveys using standardized and comparable questionnaires.

As fear of flying is observed quite often in clinical practice and may cause social and professional impairment, the existence of appropriate assessment tools is of great importance. Although fear of flying pertains to a specific situation, it is still a complex phenomenon. Fear of flying is heterogeneous and not a unitary phenomenon, and appears to be composed of a number of separate fears.⁵ Alternatively, fear of flying can also be the effect of generalization of one of more natural environment phobias as described in the DSM-IV,² such as fear of heights, falling, storms, water, instability, and so on.³ Determinants, which are also important, are fear of loss of control and a great need to have control over a situation.^{9,11} In other words, flight anxiety can be considered as the expression of other phobias or even a combination of phobias. There are different cues at different times that trigger fear of flying. Consequently, the construction of reliable and validated measures that reflects its complex structure is necessary. Self-report instruments are being used increasingly often to measure the severity of psychological disorders. This has led to the need for certain psychometric properties to be maintained across subjects and settings, so as to determine the suitability of use for a specific population.

Van Gerwen, Spinhoven, Van Dyck and Diekstra¹⁰ developed two self-report instruments that assess patients' feelings, attitudes and cognitions about specific flying-related events. Their purpose was to construct two questionnaires that cover different and complementary aspects of fear of flying. In particular, the Flight Anxiety Situations Questionnaire (FAS) is related to the level of anxiety produced by different air-travel situations, distinguishing between the preliminary phase and the actual flight; this scale covers a wide variety of situations related to the flight and allows for detailed assessment of the most relevant phobic stimuli for each patient. The second scale is the Flight Anxiety Modality Questionnaire (FAM) that focuses on anxiety responses, on the assessment of thoughts related to the danger of flying, and to the physiological sensations of anxiety while flying. The instruments were found to be cross-validated, with good internal consistency and external validity. Moreover, the subscales of the FAS and

FAM were found to be sensitive to change in measuring treatment outcomes.

According to Jenkinson and McGee,⁶ the measures need to be practical, reliable, valid, discriminative and sensitive to change, but also normative data have to be available for the countries in which they will be used. The assessment of most of the psychometric properties of the FAS and FAM is already described.¹⁰ These questionnaires are already widely used. Besides the English and Dutch versions; they have also been translated into French, German, Hebrew, Italian, Icelandic, Korean, Portuguese, Spanish and Swedish. However, normative data for the Flight Anxiety Situations Questionnaire (FAS) and the Flight Anxiety Modality Questionnaire (FAM) still has to be collected. In order to improve the usability of the FAS and FAM for diagnostic and outcome monitoring purposes, scientific research and the necessary prevalence studies, these norms are of importance.

This study presents data obtained from fear of flying patients and non-patients, as assessed with the FAS and FAM. The mean raw scores of the two groups are compared. This comparison will enable us to determine to what extent and concerning which aspects of fear of flying the scores from persons with fear of flying are different from non-patients. Furthermore, an attempt was made to derive norms for the FAS and FAM questionnaires. Finally, we will discuss the observed differences between the two samples and possible factors contributing to such differences.

Methods

Participants

The data reported in this study were obtained from participants assessed at the VALK Foundation located in Leiden, the Netherlands. This agency is a joint enterprise of the University of Leiden, KLM Royal Dutch Airlines, Transavia and Schiphol Airport Amsterdam. The sample of flying phobics that was used in this study consisted of 2072 individuals who were assessed and treated between 1996 and 2006. From June 2006 to February 2007, the FAS and FAM were also administered to a non-phobic sample consisting of 1012 participants. In order to achieve a sufficient representative sample of normal control subjects from the general Dutch population, participants were recruited in different Dutch cities, and in various public areas, such as train stations, cafés, restaurants, universities and hospitals and from different age groups. In order to assess whether the convenience sample collected in this way was representative for the Dutch population, demographic characteristics of the sample of normal controls were compared to statistical data on the Dutch population from the Central Bureau of Statistics (CBS). Administration of the questionnaires was face to face and recruitment continued until at least 1000 subjects were willing to participate.

Measurements

The *Flight Anxiety Situations Questionnaire – FAS*¹⁰ is a 32-item self-report inventory with a five-point Likert-type answering format, ranging from 1 = "no anxiety" to

5 = "overwhelming anxiety". The questionnaire assesses anxiety related to flying experienced in different flight or flight-related situations, and consists of three subscales: (a) an anticipatory flight anxiety scale, containing 14 items that pertain to anxiety experienced when anticipating a flight, (b) an in-flight anxiety scale, containing 11 items pertaining to anxiety experienced during a flight, and (c) a generalized flight anxiety scale, containing 7 items referring to anxiety experienced in connection with airplanes in general, regardless of personal involvement in a flight situation. The internal consistency of the subscales of the FAS in the present study was good to excellent, ranging from 0.85 to 0.96.

The *Flight Anxiety Modality Questionnaire – FAM*¹⁰ is an 18-item questionnaire measuring the symptoms of anxiety or anticipatory anxiety in flight situations. Each symptom is rated on a Likert-type scale ranging from 1 = "not at all" to 5 = "very intensely". The FAM measures the following modalities in which anxiety in flight situations is expressed: (a) somatic modality, pertaining to physical symptoms, and (b) cognitive modality, related to the presence of distressing cognitions. The internal consistency of the subscales of the FAM in the present study was good (both subscales 0.88).

The *Visual Analogue Flight Anxiety Scale (VAFAS)*, asks participants to indicate the extent to which she or he was anxious about flying on a one-tailed visual analogue scale, ranging from 0 = "No flight anxiety" to 10 = "Terrified".

Moreover, a *Visual Analogue Flight Liking Scale (VAFLS)*, which measures the degree to which people like to fly ranging from 1 = "do not like to fly at all" to 10 = "like to fly a lot", was used.

Procedure

Sociodemographic characteristics obtained for each respondent included age, sex, education level and living condition. Information was also collected on flying behavior, and if and how frequent the subjects had flown. FAS and FAM questionnaires were administered to the participants, including information about different aspects of fear of flying.

The FAS, FAM and VAFAS were introduced to the respondents with appropriate instructions. The VAFLS was only administered to the normal sample.

Statistical analysis

Analysis included frequency distributions and conversion of raw subscale scores to percentile ranks, which indicate an individual's relative position in the normative sample. Raw score means and standard deviations for the FAS and FAM subscales of the flying phobics and non-patient samples are also provided.

The Statistical Package for Social Sciences (SPSS) 13.0 was used for the data analysis.

Results

Characteristics of the sample

The average age of the 2072 flying phobics, 1205 women (58.2%) and 867 men (41.8%), was 40 (SD = 10.97) with

a distribution ranging from 17 to 81 years; women 39.3 years (SD = 11.2) and men 41.2 years (SD = 10.5). Sociodemographic data showed that participants' education level was relatively high: 45% received higher education (higher professional or academic training), 14.2% higher secondary vocational education, and 31.9% had elementary school education with lower vocational training, while 8.8% had attended only elementary school. Most of the participants lived with their partner (42.4%) or with their partner and children (38.2%), and only 13.6% of them lived alone or with others (5.8%). A substantial number of the patients (48.6%) also knew other people who were afraid of flying. Three hundred patients (14.5%) knew someone who had been in an incident involving an airplane. Furthermore, the majority of the participants (53.4%) reported that they pay attention to flying events presented in the media. In terms of avoidance behavior, most of the participants had flown before (91%). Of the participants who had flown, 50% flew less than 12 times. The mean time that had elapsed since their last flight was more than 56 months. On the VAFAS, the majority of the patients indicated suffering from severe to extreme anxiety at intake assessment. In particular, 90.6% of them had a score between 7 (severe anxiety) and 10 (terrified/panic); $M = 8.24$, $SD = 1.30$.

The average age of the 1012 non-patient participants, 510 women (50.4%) and 502 men (49.6%), was 37 (SD = 15.3) with a distribution ranging from 7 to 86 years; women 34.9 years (SD = 14.8) and men 38.9 years (SD = 15.5). Participants' education level was relatively high: 54.4% received higher education (higher professional or academic training), 23.9% higher secondary vocational education, and 8.4% had elementary school education with lower vocational training, while 12.4% had attended only elementary school. Most of the participants lived with their partner (29.4%) or with their partner and children (25.7%), while a smaller percentage of them lived alone (21.4%) or with others (17.7%). The majority of the participants reported that they did not know people who were afraid of flying (64.6%). Two hundred and ten participants (20.9%) knew someone who had been in an incident involving an airplane. In addition, the majority of the participants (55%) reported that they did not pay attention to flying events presented in the media. In terms of avoidance behavior, most of the participants had flown before (97.8%). Of these participants, 50% had flown more than 20 one-way flights. The mean time that had elapsed since their last flight was less than 14 months. On the VAFAS, the majority of the participants 85.7% had a score between 0 (almost no anxiety) and 3 (reasonable fear); $M = 1.10$, $SD = 1.52$. On the VAFLS the majority of the participants (76.5%) had a score between 5 (I moderately like to fly) and 10 (I like to fly a lot); $M = 6.78$, $SD = 2.56$. This indicates that a group of 23.5% does not like to fly (VAFLS) and that 14.3% had at least some problems with flying (VAFAS).

We checked the statistical data on the Dutch population from the Central Bureau of Statistics (CBS), comparing sociodemographic data of the non-patient sample to statistical data on the Dutch population. This comparison enabled us to determine whether the non-patient sample studied was representative enough. In particular, the Dutch population consists of 16,334,000 individuals, 50.5% women

and 49.4% men with a median age of 39.4 years. An average 61% of the Dutch population has completed at least secondary vocational education. This indicates that our sample is somewhat higher educated (78% compared to 61% of the Dutch population). Regarding marital status, the majority of Dutch people (51%) lived with their partner, this is slightly lower than our sample (55%).

Depending on the nature of the variables (numerical or categorical), ANOVA, Chi square test and Student *T*-test were carried out to investigate whether the non-patient group has been taken from a representative and unbiased sampling frame. Although the non-patient group is a "convenient" group and not a random selection of the general population no significant difference was found with respect to gender distribution and age, but non-patients were significantly older than flying phobics ($p < 0.05$). In addition we investigated the associations of fear of flying with age, gender and education level within the group of our own normal controls. There was, however, no correlation between fear of flying and age, gender and education level in our non-patient control group.

FAS and FAM norms

Raw score means and standard deviations for the subscales of the FAS and FAM questionnaires and the sum scale of the FAS questionnaire for flying phobics and general individuals are displayed in Table 1. Not surprisingly, the mean raw scores were consistently higher for the flying phobics than the non-patients on each of the subscales and total scale of both questionnaires. This fact indicates that the FAS and FAM questionnaires has adequate sensitivity to detect differences between patients and non-patients. With respect to the level of anxiety produced by different air-travel situations as assessed by the FAS questionnaire, patients are most different from non-patients in anticipatory anxiety ($M = 41.37$, $SD = 10.83$ and $M = 10.07$, $SD = 4.71$, respectively) and in-flight anxiety ($M = 37.68$, $SD = 8.66$ and $M = 14.51$, $SD = 5.77$, respectively). Concerning the anxiety responses as they are assessed by the FAM questionnaire, patients are most different from non-patient in reporting cognitive complaints ($M = 25.15$, $SD = 7.05$ and $M = 8.44$, $SD = 2.66$, respectively).

Table 1 FAS and FAM raw score means and standard deviations for flying phobics sample and non-patient sample

	Flying phobics sample ($N = 2072$)		Non-patient sample ($N = 1012$)	
	Mean	SD	Mean	SD
FAS				
Anticipatory anxiety	41.37	10.83	14.07	4.71
In-flight anxiety	37.68	8.66	14.51	5.77
Generalized flight anxiety	12.78	4.95	7.48	1.25
Sum score	102.42	22.48	39.84	11.92
FAM				
Somatic complaints	26.15	9.72	12.18	2.59
Cognitive complaints	25.15	7.05	8.44	2.66

To be able to interpret results of the FAS and FAM, it is necessary to compare the raw scores to standards. An attempt is made to transform scores into so-called norms, based on a reference group of acceptable size. As with all converted scores, standard scores give "meaning" to the raw test scores by providing a comparison with a norm group.⁷ Particularly, scores on psychological tests are interpreted by reference to norms which are based upon the distribution of scores obtained by a representative sample of examinees. In this way we are able to evaluate the person's performance in relation to a group in which we are interested.

Thus, we standardized the data through percentile ranks. Percentile ranks are those that correspond to the percentage of individuals in the normative sample, and each percentile expresses the percentage of the population that is ranked below that point. Therefore, a percentile shows an individual's relative position in the normative group,² but not the absolute difference between two individual scores. A percentile rank of people is not the same as a percentage score, which is a percentage of items.⁸ The conversion of raw subscale scores to percentile ranks for FAS and FAM questionnaires is presented in Tables 2 and 3, respectively.

In the flying phobic sample the 50th percentile for the FAS was as follows: anticipatory flight anxiety = 42, in-flight anxiety = 39, generalized flight anxiety = 12 and the sum score = 103, and for the FAM, as follows: somatic complaints = 50, and cognitive complaints = 26. In the non-patient sample, the 50th percentile for the FAS was: anticipatory flight anxiety = 12, in-flight anxiety = 12, generalized flight anxiety = 7 and the sum score = 35, and for the FAM was as follows: somatic complaints = 11, and cognitive complaints = 7.

When we define persons with clinically elevated scores as normal controls scoring in the 90th percentile or higher (corresponding with approximately two standard deviations or more above the mean), it is striking that most of the flying phobics score in the clinical range. On the total scale of the FAS even all flying phobics score in the clinical range.

Discussion

The present study was conducted in order to obtain normative FAS and FAM data for people who are afraid of flying. Non-patient normative samples were obtained for use in comparison with the responses of flying phobics to the FAS and FAM questionnaires. Since normative data are essential for the interpretation of test scores, our intention was to provide a standard with which scores can be compared.

From the norms constructed, we observe that the FAS and FAM questionnaires are sensitive instruments in detecting differences between patients and non-patients. Moreover, our findings suggest that a considerable number of flying phobics reported strong to fierce vehement anxiety on the "anticipatory anxiety", "in-flight anxiety" and "generalized flight anxiety" subscales of the FAS questionnaire. Most of the flying phobics also reported scores in the clinically significant range on the "somatic complaints" and the "cognitive complaints" subscales of the FAM questionnaire.

Table 2 Percentile ranks for raw FAS subscale scores for flying phobics and non-patients

	Flying phobics				Non-patients			
	Anticipatory flight anxiety	In-flight anxiety	Generalized flight anxiety	Sum score	Anticipatory flight anxiety	In-flight anxiety	Generalized flight anxiety	Sum score
Percentile rank								
5	22.00	21.00	7.00	62.00	12.00	10.00	7.00	32.00
10	26.00	26.00	7.00	73.00	12.00	10.00	7.00	32.00
15	29.95	29.00	7.00	79.00	12.00	10.00	7.00	32.00
20	32.00	31.00	8.00	84.00	12.00	10.00	7.00	32.00
25	34.00	33.00	9.00	88.00	12.00	10.00	7.00	32.00
30	36.00	34.00	9.00	92.00	12.00	10.00	7.00	33.00
35	38.00	35.00	10.00	94.00	12.00	11.00	7.00	33.00
40	39.00	36.00	11.00	97.00	12.00	11.00	7.00	34.00
45	41.00	38.00	11.00	100.00	12.00	12.00	7.00	34.85
50	42.00	39.00	12.00	103.00	12.00	12.00	7.00	35.00
55	44.00	40.00	13.00	106.00	12.00	13.00	7.00	3600
60	45.00	41.00	14.00	109.00	12.00	14.00	7.00	37.00
65	47.00	42.00	14.00	112.00	12.00	14.00	7.00	38.00
70	48.00	43.00	15.00	115.10	13.00	15.00	7.00	39.00
75	49.00	44.00	16.00	118.00	14.00	16.00	7.00	41.00
80	50.00	46.00	17.00	122.00	14.40	18.00	8.00	44.40
85	53.00	47.00	18.00	126.00	17.00	20.00	8.00	49.00
90	56.00	48.00	20.00	131.00	20.00	23.00	9.00	56.00
95	59.00	50.00	22.00	137.00	24.00	26.35	10.00	67.00
99	60.00	50.00	27.00	148.00	33.00	34.00	13.00	82.74

Furthermore, our findings enabled us to look at a deeper level and examine how patients and non-patients differ on the flight or flight-related situations (FAS) and on the modalities in which anxiety in flight situations is expressed (FAM).

Table 3 Percentile ranks for raw FAM subscale scores for flying phobics and non-patients

	Flying phobics		Non-patients	
	Somatic complaints	Cognitive complaints	Somatic complaints	Cognitive complaints
Percentile rank				
5	13.00	12.00	11.00	7.00
10	15.00	15.00	11.00	7.00
15	16.00	17.00	11.00	7.00
20	17.00	18.60	11.00	7.00
25	19.00	20.00	11.00	7.00
30	20.00	21.00	11.00	7.00
35	21.00	23.00	11.00	7.00
40	22.00	24.00	11.00	7.00
45	23.00	25.00	11.00	7.00
50	25.00	26.00	11.00	7.00
55	26.00	27.00	11.00	8.00
60	27.00	28.00	12.00	8.00
65	29.00	29.00	12.00	8.00
70	30.00	30.00	12.00	8.00
75	32.00	31.00	12.00	9.00
80	35.00	32.00	13.00	9.00
85	37.00	33.00	13.00	10.00
90	40.70	34.00	14.00	11.00
95	45.00	35.00	16.00	14.00
99	52.00	35.00	25.87	19.00

Comparing patients with non-patients on specific subscales of the FAS and FAM questionnaires is of great importance, since it gives us a better understanding about how differently the two groups react to a wide variety of situations related to the flight, as well as the different level of anxiety responses and physiological sensations of anxiety. Based on the findings derived from the FAS patients are most different from non-patients primarily in situations when anticipating a flight and secondly in situations during a flight. Concerning the manifestation of fear of flying, patients are most different from non-patients in regards to the presence of distressing cognitions.

Among the strong points of this study is that we sought to determine the psychological symptom patterns in flight phobia, based on a large group of individuals suffering from fear of flying ($N = 2072$), which strengthened the statistical components.⁴ Another strength is the wide age range of both the flying phobics and non-patient samples; the norms obtained in this study can be applied to people from different age groups. Another advantage is that research tools like the FAS and FAM questionnaires are well suited for this kind of research because they can be administered rather easily to large groups, and they do not assess only the presence or absence of flight phobia, but also the degree of fear. The FAS and FAM are useful as evaluation instruments for therapy, as they can be used to measure different aspects of fear of flying and assess the effects of treatment. The results also indicated that these instruments were brief, well understood by the respondents, and easy to administer, regardless of the respondent's gender, educational level and age.

However, the study also has certain shortcomings especially related to the samples studied. It cannot be

determined whether the findings can be generalized to people who are afraid of flying but do not seek help for their actual fear of flying. There was almost no overlap in scores on both the FAS and the FAM between the sample of flying phobics attending the VALK foundation and the sample of normal controls. Persons attending the VALK foundation report a level of fear of flying comparable to the level as reported by approximately 10% of persons in a non-patient sample. A possible explanation for this lack of overlap could be that only individuals with highly elevated levels of fear of flying seek professional help for their anxiety complaints. We hope that Civil Aviation Administrations and others who recognize the need for prevalence investigation will use the FAS questionnaire in order to find accurate percentages of fearful flyers around the globe. Now, too often the 1969 percentages of Agras et al.¹ are mentioned according to which the prevalence of different degrees of fear of flying varies from 10 to 40% in the general population of industrialized countries. Maybe these percentages need an update. We also hope that the FAM will be used more widely in treatment facilities. We are curious to see whether therapists use different treatment modalities for patients with relatively high scores on the FAM cognitive subscale (e.g. cognitive restructuring) compared to patients with relatively high scores on the FAM somatic subscale (e.g. relaxation training).

A second limitation is the non-random recruitment of the non-patient group studied. The achievement of this goal was seriously limited by the fact that the non-patient group was not collected with a stratified random sampling procedure. People were approached at different cities and different locations while an attempt was made to approach people from different age groups. Although compared to normative data for the Dutch population, no substantial differences in sociodemographic characteristics (except for level of education) were evident. However, education level proved to be unrelated to level of fear of flying suggesting that education is not a critical confounder. Future studies require random recruitment procedures in order to validate that the results of the present study are externally valid and that our convenience sample can be regarded as representative for the normal population.

The findings of this study suggest that the FAS and FAM questionnaires can be applied in the investigation of flying phobics and non-patient populations. It is an important call for future research to investigate if cross-cultural differences require that normative data be gathered for culturally different populations. It should be examined whether there is a need for normative data for different

populations to be developed, or if norms reported from the country where the scale was developed are also valid for populations from other countries. The provision of different norms of administration of the scales for different populations is essential so that investigators can make comparisons with appropriate norms and not misinterpret their data.

Conflict of interest

None declared.

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